CLAIMS

1. An infrared sensor, including:

an absorber for absorbing incident infrared power to produce a signal representing the temperature of a target object;

a frame supporting the absorber, the frame including a plurality of reflecting surfaces disposed about the circumference of the absorber for reflecting incident infrared power toward the absorber.

2. The infrared sensor of claim 1 wherein the reflecting surfaces define a light collecting region, each of the reflecting surfaces being disposed at an obtuse angle relative to the light collecting region.

3. The infrared sensor of claim 2 further including a membrane for thermally isolating the frame from the absorber, the membrane being supported by the frame and lying in the light collecting region, the absorber being disposed on the membrane.

4. The infrared sensor of claim 1 further including a plurality of series connected thermocouples, each of the thermocouples extending between the frame and the absorber.

5. The infrared sensor of claim 1 wherein each of the reflecting surfaces is coated with a metal film.

6. The infrared sensor of claim 1 wherein the reflecting surfaces define a cavity having a substantially rectangular cross section.

7. The infrared sensor of claim 1 wherein the frame includes a body for supporting the absorber and a light concentrator attached to the body, the reflecting surfaces being disposed on the light concentrator.

8. The infrared sensor of claim 7 wherein the light concentrator is micromachined silicon, including first and second parallel segments, a third segment connected between one end of the first segment and one end of the second segment at a right angle to the first and second segments, and a fourth segment connected between the other ends of the first and second segments at a right angle to the first and second segments and parallel to the third segment.

9. The infrared sensor of claim 8 wherein each of the segments includes an inward side and an outward side, the reflecting surfaces being disposed on the inward sides of the segments.

10. The infrared sensor of claim 1 further including a circuit board having a void, the frame being mounted to the circuit board such that the absorber is disposed adjacent the void.

11. The infrared sensor of claim 10 further including a silicon window attached to the frame and extending between the reflecting surfaces, the silicon window enclosing the absorber.

12. The infrared sensor of claim 11 wherein the silicon window includes an outside surface having an antireflection coating and an inside surface adjacent the absorber having an interference filter.

13. The infrared sensor of claim 7 wherein the light concentrator encloses the body and includes a bottom wall to which the body is mounted, four side walls

surrounding the body, each of the side walls including one of the reflecting surfaces, and a silicon window extending between the side walls, parallel to the bottom wall.

14. The infrared sensor of claim 1 wherein the absorber is mounted to a membrane which spans an opening defined by the frame, each reflecting surface having one edge adjacent the perimeter of the opening and an opposite edge offset outwardly from the perimeter of the opening.

15. The infrared sensor of claim 1 wherein the frame defines a rectangular opening having a perimeter, the frame including four segments disposed about the perimeter, each of the segments having an inner side defining one of the reflecting surfaces.

16. The infrared sensor of claim 15 wherein the inner side of each reflecting surface extends from adjacent the perimeter of the opening to an apex of the triangular cross section.

17. The infrared sensor of claim 15 wherein each segment inner side includes a chamfered edge disposed adjacent the perimeter of the opening, the corresponding reflecting surface ending at the chamfered edge.

18. The infrared sensor of claim 15 wherein each of the segments includes a top surface which is substantially parallel to the absorber, the sensor further including a silicon window mounted to the top surfaces of the segments.

19. An infrared sensor, including:

a frame defining an opening;

a membrane spanning the opening;

an absorber disposed on the membrane for absorbing incident infrared power and heating in response thereto;

the frame including four side walls defining a cavity adjacent one side of the membrane, each of the side walls having a reflecting surface disposed at an angle relative to the absorber for reflecting incident light toward the absorber.

20. The infrared sensor of claim 19 further including a plurality of series connected thermocouples, each of the thermocouples extending between the frame and the absorber.

21. The infrared sensor of claim 19 wherein each of the reflecting surfaces is coated with a metal film.

22. The infrared sensor of claim 19 wherein the frame includes a body for supporting the absorber and a light concentrator attached to the body, the reflecting surfaces being disposed on the light concentrator.

23. The infrared sensor of claim 22 wherein the light concentrator is micromachined silicon, including first and second parallel segments, a third segment connected between one end of the first segment and one end of the second segment at a right angle to the first and second segments, and a fourth segment connected between the other ends of the first and second segments at a right angle to the first and second segments and parallel to the third segment.

24. The infrared sensor of claim 19 further including a circuit board having a void, the frame being mounted to the circuit board such that the absorber is disposed adjacent the void.

25. The infrared sensor of claim 19 further including a silicon window attached to the frame to enclose the absorber, the window extending between the reflecting surfaces.

26. The infrared sensor of claim 25 wherein the window includes an outside surface having an antireflection coating and an inside surface adjacent the absorber having an interference filter.

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27. The infrared sensor of claim 22 wherein the light concentrator encloses the body and includes a bottom wall to which the body is mounted, four side walls surrounding the body, each of the side walls including one of the reflecting surfaces, and a silicon window extending between the side walls, parallel to the bottom wall.

28. The infrared sensor of claim 19 wherein each reflecting surface has one edge adjacent the perimeter of the opening and an opposite edge offset outwardly from the perimeter of the opening.

29. The infrared sensor of claim 19 wherein the frame defines a rectangular opening having a perimeter, the frame including four segments disposed about the perimeter, each of the segments having an inner side defining one of the reflecting surfaces.

30. The infrared sensor of claim 29 wherein each segment has a substantially triangular cross section, the inner side of each reflecting surface extending from adjacent the perimeter of the opening to an apex of the triangular cross section.

31. The infrared sensor of claim 29 wherein each inner side includes a chamfered edge disposed adjacent the perimeter of the opening, the corresponding reflecting surface ending at the chamfered edge.

32. The infrared sensor of claim 29 wherein each of the segments includes a top surface which is substantially parallel to the absorber, the sensor further including a silicon window mounted to the top surfaces of the segments.

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33. An infrared sensor, including:

an absorber for absorbing incident infrared power and heating in response thereto;

a frame including four segments defining an opening, the absorber being disposed within the opening; and

a plurality of thermocouples connected in series and extending between the absorber and the frame, each of the thermocouples having a Seebeck voltage which depends upon the temperature difference between the frame and the absorber;

wherein each of the four segments include a reflecting surface disposed at an angle relative to the absorber for reflecting incident infrared power toward the absorber, the reflecting surfaces collectively defining the sides of a light concentrating cavity.

34. The infrared sensor of claim 33 wherein the reflecting surfaces are disposed at an obtuse angle relative to the absorber.

35. The infrared sensor of claim 33 further including a membrane for thermally isolating the frame from the absorber, the membrane being supported by the frame and spanning the opening, the absorber being disposed on the membrane.

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36. The infrared sensor of claim 33 wherein each of the reflecting surfaces is coated with a metal film.

37. The infrared sensor of claim 33 wherein the frame includes a body for supporting the absorber and a light concentrator attached to the body, the reflecting surfaces being disposed on the light concentrator.

38. The infrared sensor of claim 37 wherein the light concentrator is micromachined silicon, including first and second parallel segments, a third segment connected between one end of the first segment and one end of the second segment at a right angle to the first and second segments, and a fourth segment connected between the other ends of the first and second segments at a right angle to the first and second segments and parallel to the third segment.

39. The infrared sensor of claim 38 wherein each of the segments includes an inward side and an outward side, the reflecting surfaces being disposed on the inward sides of the segments.

40. The infrared sensor of claim 33 further including a circuit board having a void, the frame being mounted to the circuit board such that the absorber is disposed adjacent the void.

41. The infrared sensor of claim 33 further including a silicon window attached to the frame and extending between the reflecting surfaces, the silicon window enclosing the absorber.

42. The infrared sensor of claim 41 wherein the silicon window includes an outside surface having an antireflection coating and an inside surface adjacent the absorber having an interference filter.

43. The infrared sensor of claim 37 wherein the light concentrator encloses the body and includes a bottom wall to which the body is mounted, four side walls

surrounding the body, each of the side walls including one of the reflecting surfaces, and a silicon window extending between the side walls, parallel to the bottom wall.

44. The infrared sensor of claim 33 wherein the absorber is mounted to a membrane which spans the opening, each reflecting surface having one edge adjacent the perimeter of the opening and an opposite edge offset outwardly from the perimeter of the opening.

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45. The infrared sensor of claim 33 wherein the frame includes four segments disposed about a perimeter of the opening, each of the segments having an inner side defining one of the reflecting surfaces.

46. The infrared sensor of claim 45 wherein each of the segments has a substantially rectangular cross section, the inner side of each reflecting surface extending from adjacent the perimeter of the opening to an apex of the triangular cross section.

47. The infrared sensor of claim 45 wherein each segment inner side includes a chamfered edge disposed adjacent the perimeter of the opening, the corresponding reflecting surface ending at the chamfered edge.

48. The infrared sensor of claim 45 wherein each of the segments includes a top surface which is substantially parallel to the absorber, the sensor further including a silicon window mounted to the top surfaces of the segments.